wissen Entwickelungsphasen durch innigere Aneinanderlagerung und gegenseitige Abflachung der Zellen zeitweise verändert wird.

Der Mundpol der jungen *Hydra* entspricht dem vegetativen Pole des Eies.

Graz, am 1. August 1880.

5. Preliminary Abstract of Observations upon the Early Stages of some Polychaetous Annelides.

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The following is a brief summary of some observations on the development of the marine Annelides, and is published as preliminary to a more extended illustrated paper upon the subject. Notwithstanding some excellent work in this direction a very wide field for research is unexplored; and the early stages, the segmentation and formation of the germinal layers, are very imperfectly known. During this and the proceding summer I have had an opportunity at the Chesapeake Zoological Laboratory of studying the early stages of a few forms, the results of which studies are here in part summarised.

1) *Clymenella torquata* (Leidy) Verrill. The eggs are slightly oval, of considerable size, with granular opaqu eprotoplasm and a rather thin apparently homogeneous enclosing membrane which is directly converted into the cuticle of the larva. They are several hundred in number and are embedded in masses of firm transparent jelly issuing from the mouths of the tubes secreted by the worms. The segmentation is closely similar to that of the Oligochaetous genera *Euaxes* and *Tubifex* as described by Kowalevsky; and it is, if the account of Claparède and Metschnikoff is correct, somewhat unlike that of other Polychaeta. No polar globules of any constant position were observed. The first cleavage divides the egg into two unequal spherules. The second divides the smaller of these into two equal parts and the larger into two unequal parts. The third cleavage separates from these four primary blastomeres four much smaller ones (micromeres) at one pole of the egg. The latter soon become so displaced as to alternate with the former (macromeres).

The micromeres increase in number by sub-division and receive accessions from the division of the macromeres, which they grow around and include. Two large spherules, derived from the larger of the two primary blastomeres, are visible up to a late stage at the posterior end of the embryo. At first at the surface, they are subsequently grown over by the ectoderm and disappear. I cannot state their relation to the germ-bands, a question which must be reserved for study by means of sections. The mouth appears on the ventral side nearly opposite to the point where the first four micromeres were formed. The

anus seems to arise subsequently, at the posterior extremity of the embryo. During the segmentation periods of activity alternate with well marked periods of rest.

The larva acquires dorsal eye-specks, a very broad prae-oral belt of short cilia, a much narrower prae-anal belt and a broad ventral band, and then passes directly into the adult, without decided metamorphosis. The setae develop from before backwards, and those of the dorsal ramus appear before those of the ventral.

2) *Arenicola cristata* Stimpson. The eggs of this huge annelide are, like those of *Clymenella*, embedded in gelatinous masses. These masses are from two to six feet in length, from six to two inches in diametre, and each contains several hundred thousand eggs. The protoplasm is slightly brownish in color so that the masses appear of a decided cinnamon-brown color. The eggs are much smaller than those of *Clymenella*, and are more nearly spherical. The egg membrane is proportionally much thicker and is strongly striated radially when viewed by oblique light. The segmentation and subsequent development are almost identical with those of *Clymenella* and the same account will serve for both. The embryos are likewise Telotrochous forms but the cilia of both the anterior and posterior belts are much more powerful and the larvae swim more rapidly and freely. The period during which the young of both species swim freely at the surface is very brief. Both soon sink to the bottom and secrete tubes or gelatinous masses in which they live.

3) *Diopatra cuprea* (Claparède). The eggs of this species are still larger than those of *Clymenella* and are likewise embedded in gelatinous masses attached to the mouths of the tubes of the worms. They are nearly spherical, perfectly opaque, and are pigmented in irregular spots on the surface. The masses are cylindrical, 18 inches to two feet in length and about $^1/_2$ inch in diametre. The jelly is very soft and slimy. Of the early stages I can unfortunately say nothing. All efforts to find the segmentary eggs were unavailing. The larvae are at first true Atrocha, having an anterior apical tuft, a very broad band in the middle region and a narrow and irregular anal band. Two reddish eye-speeks are present and the larva closely resembles the Eunicid larva figured by Claparède and Metschnikoff. The antennae bud out when the larva has acquired 4 setigerous segments. The tentacular cirrhi appear later.

4) *Spiochaetopterus oculatus* Webster. Larvae taken in Chesapeake Bay which are in all probability of this species are, like other Chaetopterid larvae, mesotrochal. There is a single belt of cilia. The larva is closely similar to that of *Phyllochaetopterus* figured by Claparède and Metschnikoff. The branchiae first appear when the posterior region has about ten segments.

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